

POWERPOINT-BASED LECTURES IN BUSINESS EDUCATION: AN EMPIRICAL INVESTIGATION OF STUDENT-PERCEIVED NOVELTY AND EFFECTIVENESS

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The use of PowerPoint (PPT)-based lectures in business classes is prevalent, yet it remains empirically understudied in business education research. The authors investigate whether students in the contemporary business classroom view PPT as a novel stimulus and whether these perceptions of novelty are related to students' self-assessment of learning. Results indicate that the degree of novelty that undergraduate business students associate with PPT-based teaching significantly relates to their perceptions of PPT's impact on cognitive learning and classroom interaction. Students' views of PPT as a novel stimulus are also associated with their perception of specific constructive and dysfunctional classroom behaviors and attitudes. The authors discuss their findings and offer implications for instructors and researchers in business education.

Keywords: *business education; stimulus novelty; learner perceptions; PowerPoint; classroom learning and interaction*

POWERPOINT (PPT) LECTURES have become integral to instruction at most institutions, especially at colleges of business and in fields such as business communication. A great deal of commentary permeates the popular literature regarding PPT's effectiveness, although it is largely anecdotal and editorial in nature (e.g., Guernsey, 2001; Harris, 2004; Jones & Bowen, 2004; Norvig, 2003; Wineburg, 2003). Although various studies of PPT's influence on student performance appear in the higher education literature, their findings produce a somewhat inconsistent picture. One area not addressed by these prior studies is the extent to which students perceive PPT as novel and the subsequent effect that perception has on perceived student learning. In this empirical study, we explore the

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concept of stimulus novelty to ascertain whether this variable contributes to students' perceptions of how PPT influences learning, classroom interaction, and other relevant classroom behaviors and attitudes. We then discuss the findings from our study and offer suggestions to help business instructors improve their effective presentation of course content.

LITERATURE REVIEW

PPT in Higher Education Lectures

Prior higher education studies have primarily examined PPT's influence on academic performance or content recall. In their study comparing three conditions (an overhead lecture, a PPT lecture, and a PPT lecture with notes), Szabo and Hastings (2000) found higher grades in both PPT conditions compared to the overhead lecture. Bartsch and Cobern (2003) compared the effectiveness of overheads, basic PPT (text only), and expanded PPT (with graphics and sounds); similarly, they found that students scored at the end of the semester significantly better in the basic PPT condition on content recall. However, Daniels (1999) reported no significant differences in students' cognitive performance when PPT was used. In Amare's (in press) study of undergraduate students in a technical writing course, performance scores were actually higher in the traditional lecture format than in PPT-enhanced lectures. Thus, findings about the effect of PPT on academic performance are somewhat mixed.

Nowaczyk, Santos, and Patton (1998) assessed student perceptions of PPT usage in an introductory behavioral statistics course and found that students' perceptions were moderated by their academic performance. That is, students with lower test scores believed the pace of the lecture was too fast, whereas students who did better on exams thought the PPT slides helped them better comprehend course information. In a follow-up comparison of PPT and a traditional format, as measured at the midterm and the final, students reported at both junctures that they preferred PPT to help them understand the course material. Interestingly, at final exam time, students reported that they favored traditional lecture format for enhancing classroom interaction among students and instructors. This last finding, along with similarly

reported results in a sample of business students (James, Burke, & Hutchins, 2006), indicates that PPT may deter classroom interactions by minimizing classroom spontaneity (Murphy, 2002) and hindering deeper discussions (Hanft, 2003; McDonald, 2004). It also suggests that PPT's influence in higher education likely goes well beyond test scores and other cognitive measures.

Although previous studies are expressly limited, other dysfunctional student behaviors associated with PPT use have been explored. For example, a study by Frey and Birnbaum (2002) in a Russian fairy tale course indicated that 19% of students perceived PPT as increasing inappropriate student behaviors; specifically, 15% of respondents claimed they were less likely to attend the class when notes were posted on the Web. However, Szabo and Hastings (2000) found just the opposite, that is, that PPT lectures increased lecture attendance. And in the James et al. (2006) investigation, students did not believe that posting notes on the Web affected their motivation to attend class. Again, there are conflicting results, suggesting that other variables might be at play, meriting exploration. Although many of these studies attempted to measure learning to assess PPT lectures, both Frey and Birnbaum (2002) and James et al. (2006) relied on student perceptions of activity related to the lecture format, which is what the current study addresses by focusing on students' perception of *novelty* as it relates to perceived learning and student behavior.

The Importance of Stimulus Novelty

Almost a decade ago, Atkins-Sayre, Hopkins, and Mohundro (1998) reported that students regarded PPT highly and perceived it as a useful cognitive aid for maintaining their interest, enhancing their understanding, and encouraging retention of material. Whether students continue to find PPT engaging and interesting in the higher education arena remains unknown. Also uncertain is whether students' perceived novelty of this particular medium subsequently influences their learning, behavior, or attitudes. We suggest that the novelty perceived by students in PPT-based business lectures is variable and that stimulus novelty may be an important influence in students' perceptions of PPT's effectiveness.

An extensive and longstanding body of research provides overwhelming evidence that novelty substantially influences the amount

and depth of information processing undertaken by individuals. Pertinent to the current work, several studies suggest it is not just the novelty of the information but rather the novelty of the stimulus itself that may result in greater attention, message elaboration or processing, and recall. In describing a classic study by von Restorff (1933), Lynch and Srull (1982) highlighted von Restorff's finding that "almost any technique that served to increase the novelty of particular items or led them to be unexpected enhanced the recall of those items" (p. 32).

The "von Restorff effect" has been replicated in a variety of contexts and disciplines (Hastie, 1981). For example, in the field of marketing, studies of novel products, novel advertising messages, and novel methods of conveying information have successfully demonstrated a link between stimulus novelty and various positive attitudes and outcomes. Specifically, novel products generate more intense affective reactions and stronger purchase intentions and attitudes toward the ad and brand compared to familiar products (Cox & Locander, 1987). Novel billboard advertising messages have also been found to result in significantly higher levels of information recall (Hewitt, 1972), and novel promotional formats—such as comparative advertising when first used—benefited from consistently higher levels of attention (Prasad, 1976). Although these studies represent but a small sampling of those available, the robustness of the von Restorff effect strongly suggests that the degree to which students perceive PPT as being novel influences their attention, interest, cognitive recall, and related behavioral intentions (for an extensive review of the von Restorff effect, see Hastie, 1981).

More recently, stimulus novelty has been posited as one aspect of curiosity "that links cues reflecting novelty and challenge (internal or external) with growth opportunities" (Kashdan, Rose, & Fincham, 2004, p. 291). Citing the groundbreaking work of Berlyne (1960, 1971) and Berlyne, Graw, Salapatek, and Lewis (1963), Kashdan et al. (2004) reiterated that stimulus novelty is one of several factors influencing an individual's diversive and specific curiosity. Diversive curiosity is exhibited when an individual actively searches for challenges or novelty; as a result, the individual purposively allocates more attention toward novel stimuli. Specific curiosity occurs when an individual actively attempts to develop a greater understanding of novel stimuli or activities, resulting in enhanced cognition and flow

states (Kashdan et al., 2004). In other words, current theory views curiosity as a motivational factor in personal growth that results in willingness on the part of individuals to seek out or orient themselves toward novel stimuli (Depue, 1996; Kashdan et al., 2004; Spielberg & Starr, 1994). Learning is essentially a process of personal growth, and so we contend that curiosity is a motivational factor in the learning process. Support for our contention also stems from literature linking curiosity and attention as integral variables affecting learner motivation (Keller, 1983). For example, in Burke and Moore's (2003) study of 241 undergraduates, students reported less motivation at the outset of an organizational behavior course (compared to other courses such as accounting) in part because of their lower arousal from and interest in course content. In sum, the perceived novelty of PPT as a teaching tool in business education may have comparable implications for garnering student attention, facilitating content recall, and facilitating positive attitudes.

Based on the review of the novelty literature, it is argued here that students who perceive the use of PPT to be a novel practice in business education will evaluate the effectiveness of PPT more favorably. This study attempts to examine whether significant differences exist between students who find PPT novel and those who do not. Specifically, this study explores the differences between those two groups with respect to their perceptions of learning, their perceptions of classroom interaction, and their reports of dysfunctional and constructive student behaviors.

METHOD

Sample and Data Collection Procedures

As part of a larger study on business faculty member views and student perceptions regarding PPT (James et al., 2006), undergraduate business students enrolled in various accounting, business law, economics, finance, information systems and decision sciences, management, and marketing courses at a comprehensive urban university in the South were sampled. Anonymous data were gathered from 14 of the 15 courses initially targeted, for a course response rate of 93.3%. Because students could encounter the survey in more than one class, the questionnaire instructions directed students not to

complete a second survey. Of the 262 surveys collected, 32 surveys were eliminated as unusable because of incomplete information or because the survey respondents were graduate students or not business majors. This elimination process resulted in a final sample size of 230 undergraduate business students.

Measures

Student perceptions of the effectiveness of PPT compared to traditional lecture were assessed using measures adapted from those used in prior research (Nowaczyk et al., 1998). A total of 17 items purporting to measure the effectiveness of PPT with respect to the presentation of class material, student understanding of course material, and classroom interactions were administered to student samples. An exploratory factor analysis was performed; an examination of the factor loadings indicated that five items loaded strongly on both factors, and these items were subsequently eliminated to improve the purity of each measure. Two factors with an Eigenvalue greater than 1 were extracted, which accounted for 61.67% of the variance. Next, a principal components analysis using varimax rotation was performed. The resulting two-factor solution, displayed in the appendix, describes two constructs that relate to the impact of PPT on *cognitive learning* and *classroom interactions*. Factor 1 contained seven items ($\geq .60$) and was labeled Cognitive Learning because this factor deals with the information processing associated with a cognitive understanding of course materials. Factor 2 contained four items ($\geq .60$) and was labeled Classroom Interactions because this factor deals with classroom rapport and class relations. The Cronbach's alphas were .879 and .868 for the Cognitive Learning and Classroom Interactions scales, respectively.

Several Likert-type statements drawn from prior research (Frey & Birnbaum, 2002) were used to assess perceptions of PPT's influence on classroom behaviors and attitudes, such as paying attention during class, note taking, and motivation to attend. Because a review of the literature provided only limited evidence regarding PPT's influence on other types of student behaviors and attitudes, logical items such as the likelihood of talking during class and perceived boredom and burnout were included using a 6-point Likert-type format, with responses ranging from *strongly disagree* (1) to *strongly agree* (6).

Novelty, or the degree to which students viewed the use of PPT in their classes as being exciting and interesting, was measured using an established scale with four 6-point Likert-type items (Unger & Kernan, 1981). Responses ranged from *strongly disagree* (1) to *strongly agree* (6). Two sample items in this established scale are “It satisfies my sense of curiosity” and “I feel like I’m exploring new worlds.” Scores on the summated measure were used to classify student respondents according to how novel they perceived the usage of PPT in their business courses; only students completing all four scale items were used in the analysis.

RESULTS

Sample Description

Various business majors were included in this study (18.3% accounting, 15.7% finance, 27.0% management, 23.0% marketing, 16.1% general business), and 50.0% of the sample were seniors, 39.1% were juniors, and the rest were predominantly sophomores. The sample was 53.0% female, and the average age was 25.15 years, with a standard deviation of 5.53 years.

High Versus Low Novelty: Differences for Learning and Classroom Interaction

Students classified as perceiving “low-novelty” levels had summated measure scores from the minimum possible score of 6 up to 12 (27.6%); “moderate-novelty” levels were determined by summated moderate scores of 13 to 18 (49.3%), and those whose scores fell in the range from 19 up to the maximum possible score of 24 were classified as part of the “high-novelty” group (23.0%). The low-novelty group had an item mean of 2.58 on the novelty scale, whereas the high-novelty group had an item mean of 5.40. These two means were statistically significantly different at $p < .01$, indicating a level of validity for using these two groupings.

We examined the differences in learning and classroom interactions based on the level of perceived novelty. Consistent with stimulus novelty research, results of independent samples *t* tests found statistically significant differences between the high- and low-novelty

Table 1. PowerPoint's Influence on Cognitive Learning and Classroom Interaction—Low- Versus High-Novelty Conditions

<i>Scale^a</i>	<i>n</i>	<i>SD^b</i>	<i>Item M</i>	<i>t Statistic</i>	<i>p Value*</i>
Cognitive learning				-4.510	< .001*
Low-novelty group	60	8.61	4.41***		
High-novelty group	49	6.38	5.34***		
Overall	215	7.32	4.76		
Classroom interaction				-3.458	< .001*
Low-novelty group	60	5.05	3.18**		
High-novelty group	46	5.74	4.09***		
Overall	210	5.15	3.50		

a. Each scale was assessed using a Likert-type scale, where 1 = *traditional lecture better* and 6 = *PowerPoint lecture better*.

b. The reported standard deviation is for the summated scale measure.

*Significance of differences between high- and low-novelty group means.

**Significantly lower than the neutral value of 3.5 at the $p < .05$ level.

***Significantly higher than the neutral value of 3.5 at the $p < .05$ level.

conditions for both Cognitive Learning and Classroom Interactions, as shown in Table 1. Specifically, Table 1 lists the means, standard deviations, t statistics, and p values associated with high- versus low-novelty groups on the cognitive learning and classroom interaction criterion measures. Closer examination of the mean scores and one-sample t tests comparing item mean scores to a neutral value of 3.5 (on the 6-point scale) confirmed the following: Although students who associate both low and high levels of novelty with the use of PPT in business education believe that PPT's impact on cognitive learning is better than traditional lecture, those who evaluated PPT as highly novel have a significantly more positive opinion of PPT's impact on cognitive learning than do those who evaluated PPT's novelty as low ($t = -4.510$, $p < .001$).

Furthermore, we see in Table 1 that the impact of PPT on classroom interactions was viewed significantly more favorably than that of traditional lecture only by those in the high-novelty group. In fact, those students who associated a low degree of novelty with PPT rated PPT's impact on class interactions significantly lower than did those in the high-novelty condition ($t = -3.458$, $p < .001$), indicating their belief that a traditional lecture format was more effective for stimulating classroom exchanges.

Table 2. PowerPoint's Influence on Constructive Classroom Behaviors and Attitudes—Low- Versus High-Novelty Conditions

Item ^a	n	M	SD	t Statistic	p Value*
PowerPoint handouts help me take better notes during classroom lectures.				-3.298	.001*
Low-novelty group	60	4.42**	1.69		
High-novelty group	49	5.35**	1.25		
Visual images presented in PowerPoint-based lectures help me recall content during exams.				-3.790	< .001*
Low-novelty group	60	4.08**	1.43		
High-novelty group	50	5.41**	1.34		
I have a positive attitude towards PowerPoint lectures.				-5.445	< .001*
Low-novelty group	60	4.75**	1.51		
High-novelty group	49	5.40**	1.02		
PowerPoints help emphasize the key points during the lectures.				-3.328	.001*
Low-novelty group	59	4.75**	1.17		
High-novelty group	50	5.40**	0.88		
PowerPoint-based lectures hold my attention during class.				-4.758	< .001*
Low-novelty group	60	3.43	1.48		
High-novelty group	49	4.80**	1.50		

a. All items were assessed using a Likert-type scale, where 1 = *strongly disagree* and 6 = *strongly agree*.

*Significance of differences between high- and low-novelty group means.

**Significantly higher than neutral value of 3.5 at the $p < .05$ level, indicating agreement with statement.

High Versus Low Novelty: Differences for Constructive Classroom Behaviors and Attitudes

Next, the impact of PPT on specific constructive classroom behaviors and attitudes was explored. Means, standard deviations, t statistics, and p values associated with low- and high-novelty conditions are displayed in Table 2. Notably, as Table 2 indicates, significant differences existed between the low- and high-novelty conditions for every item tested. The overall pattern of results indicates that those students who associated a high degree of novelty with PPT evaluated its influence on their classroom behaviors and attitudes significantly more favorably than did students in the low-novelty condition.

On closer inspection of specific item responses, the vast majority of one-sample *t* tests comparing item means to a neutral point of 3.5 were significant at the $p < .05$ level for both the high- and low-novelty conditions. This more detailed look shows that although both groups had typically positive perceptions to report about PPT's influence on specific constructive class-related behaviors and attitudes, the high-novelty group's favorability was significantly higher than that of the low-novelty group. Specifically, students in the high-novelty condition reported that PPT has a favorable impact on their ability to take notes, recall content during the exam, and pay attention during class. They also reported significantly more positive attitudes toward PPT lectures and positive views of the organizational skills of professors using PPT. PPT was also evaluated by the high-novelty group more favorably with respect to its ability to emphasize key lecture points. The one variable in Table 2 where evaluations were not significantly different (from a neutral value of 3.5) occurred under the low-novelty condition for the statement, "PowerPoint-based lectures hold my attention during class."

High Versus Low Novelty: Differences for Dysfunctional Classroom Behaviors and Attitudes

Last, PPT's impact on dysfunctional classroom behaviors was investigated. Means, standard deviations, *t* statistics, and *p* values with low- and high-novelty conditions are displayed in Table 3. With respect to the behaviors of talking in class, motivation to attend class when PPT lectures are used, and likelihood of attending class when PPT handouts are posted to the Web, no significant differences were found between the low- and high-novelty conditions at the $p < .05$ level. Interestingly, students in the low- and high-novelty groups both disagreed with the statement that they would be less likely to attend class when PPTs were posted on the Web.

With respect to items tapping students' negative attitudes (e.g., "I am tired of PPT-based teaching"), some significantly less favorable attitudes were found among the low-novelty condition (expressed via higher levels of agreement with negative attitudes). Specifically, the mean value for the low-novelty group in response to the question "I've become bored with the PowerPoint in my class" is significantly higher

Table 3. PowerPoint's Influence on Dysfunctional Classroom Behaviors and Attitudes—Low- Versus High-Novelty Conditions

<i>Item^a</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t Statistic</i>	<i>p Value*</i>
PowerPoint-based lectures increase the likelihood of students talking to each other while the professor lectures.				1.216	.227
Low-novelty group	60	3.35	1.40		
High-novelty group	50	2.96**	1.87		
I am less motivated to attend class when PowerPoints are used during the lecture.				1.968	.052
Low-novelty group	59	3.39	1.68		
High-novelty group	50	2.74**	1.76		
I am less likely to attend class when the professor posts PowerPoint handouts to the Web.				1.092	.277
Low-novelty group	60	2.95**	1.60		
High-novelty group	50	2.60**	1.76		
I've become bored with the PowerPoint in my class.				6.312	< .001*
Low-novelty group	60	4.08***	1.44		
High-novelty group	50	2.30**	1.52		
I am tired of PowerPoint-based teaching.				4.199	< .001*
Low-novelty group	60	3.03**	1.64		
High-novelty group	49	1.88**	1.24		
I am burned out on PowerPoint.				4.630	< .001*
Low-novelty group	60	3.28	1.66		
High-novelty group	50	2.00**	1.25		
PowerPoint-based lectures are overused in business courses.				3.697	< .001*
Low-novelty group	60	3.35	1.52		
High-novelty group	49	2.31**	1.40		

a. All items were assessed using a Likert-type scale, where 1 = *strongly disagree* and 6 = *strongly agree*.

*Significance of differences between high- and low-novelty group means.

**Significantly lower than the neutral value of 3.5 at the $p < .05$ level, indicating disagreement with statement.

***Significantly higher than the neutral value of 3.5 at the $p < .05$ level, indicating agreement with statement.

than the neutral value, indicating that they agree with the statement and find PPT uninteresting. In fact, the level of boredom with PPT increases as the perceptions of novelty decline (whereas high-novelty students disavow feelings of PPT burnout or overuse). The high-nov-

elty group disagreed with all of the listed negative behaviors and attitudes associated with PPT (indicating they associated few negative consequences with PPT). At the same time, we should note that students who associated low novelty with PPT did not report being “tired” of a PPT-based teaching method. Taken together, these findings suggest that low-novelty business students may not be excited about PPT lectures, but at the same time they (and certainly high-novelty students) have little problem with PPT-driven teaching.

Finally, students were asked, via an open-ended question, to indicate their number one concern related to the use of PPT in business education courses. Only 18.5% of the responses were positive or neutral, which perhaps is not surprising given the manner in which the question was framed. A sampling of unenthusiastic student responses is displayed in Table 4, clustered by topic. A few findings that might be appealing to investigate in future work include disincentives to buy textbooks, daydreaming during lecture, and lack of substantive exchange among students and instructors.

DISCUSSION

In our sample, only 27% of students perceived the use of PPT as interesting and fresh in their business classes, suggesting that the perceived novelty of this instructional medium is far from ubiquitous. It is more important that the results of this study suggest that the degree of “newness” business students connect to PPT-based teaching is associated with their perceptions of PPT’s impact on cognitive learning, classroom interaction, and certain student behaviors and attitudes. We discovered that business students who perceived PPT as lacking in novelty also tended to view traditional lecture as more effective in facilitating social interaction and class discussion compared to PPT. We also found that undergraduate students who perceived the use of PPT as lacking in novelty were less inclined to attribute positive outcomes or report positive attitudes as a result of PPT usage in business education. They were also slightly more likely to attribute to PPT negative classroom behaviors and attitudes, particularly boredom and attention difficulties.

One implication of our study is somewhat troubling: The effectiveness of PPT as a teaching tool may continue to decline over time. Based

Table 4. Selected Student Comments Clustered by PowerPoint's Detrimental Effects

Question: What is your number one concern related to the use of PowerPoint in business classes?^a*Negative Influence on Student Behaviors*

If professors use PowerPoint, I have no reason to buy the book, take notes, or pay attention. They post slides on Blackboard!

It makes me not want to take notes because everything is already there.

It makes me daydream because I'm staring at the same thing for awhile.

If instructors only read PPT presentations, why go to class?

Negative Influence on Classroom Interaction

Boring and ineffective if doesn't include discussion and participation.

It takes away from the actual one-on-one conversation or class debates.

It still doesn't provide an open forum in which teacher and student can engage in intellectual conversation.

PPT doesn't lead to detailed discussions.

Professors use it as a crutch where there is no class interaction. Material is recycled semester to semester which makes it just as effective to not attend class and just study handouts.

The classes are very boring and there is usually no interaction between teachers and students.

Material on PPT does not stay with the student. Not being actively involved makes the students lose interest.

When professors use PowerPoint as the main teaching aid versus using it as a supplement to discussion.

Negative Influence on Instructor Delivery & Student Learning

Horrible when professors read word for word and add nothing else to lecture.

Overuse of slides. . . . I can read a book. It does not need to be read to me by the instructor while looking at a slide.

Professors rely on them too heavily and don't stimulate the class by mixing it with other teaching styles.

Presentations rarely changed/professors too dependent.

PPT should be used to aide the professor, not teach for them which is what many of the professors do.

PPT slides aren't detailed enough. Some instructors read the slides word for word, then the exam is something totally different.

There are not enough examples and graphics included. There is nothing to attract or hold attention. I feel PowerPoint makes me dumb.

Too many graphics . . . just give us the material.

I wouldn't like PowerPoint in finance where you need step-by-step instruction and examples. PowerPoint works best in classes with lots of definitions and lecture, or the teacher talks too fast.

Mathematical problems are harder to understand when already typed instead of instructor manually writing step by step.

That people get "fed" or "handed" info instead of paying attention and actively learning to get this info.

Too much material too fast.

It's hard to keep up with the lecture.

Sometimes wastes time on less important points.

a. Only 10.0% of student responses to this question about PPT were positive; 8.5% were neutral.

on the stimulus novelty literature and taking our findings to their logical conclusion, one might expect to find that, over time, as students become less curious and interested in this instructional media, they will increasingly pay less attention, recall information less effectively, and spend less time pondering the richness of course concepts. Certainly, much of the anecdotal information in the practitioner literature as well as the qualitative results of this study support this proposition and suggest it may already be occurring in segments of the undergraduate business student population inundated with PPT lectures in their curriculum. However, longitudinal research is needed to assess this.

One might infer from the stimulus novelty literature that business faculty need new software to solve student concerns. Although this alternative may help to address certain PPT deficiencies, the underlying issue may have more to do with *how* PPT is used than the medium itself. In other words, if a new medium is chosen to compensate for specific PPT limitations in business education, then relevant support, training, and development may be needed to ensure that old problems are not merely transferred to the new software. We address this issue further in the conclusion. At a simpler level, merely updating the course content on a regular basis, incorporating recent examples verbally in the class discussion, and tying current events to discussion questions could alleviate some student concerns with PPT use. If such tasks are neglected, students will likely view course material as recycled, outdated, or too generic.

To combat student disengagement associated with PPT, as implied by students' comments in Table 4, instructors should be careful not to use PPT as a convenient "crutch" (Tufte, 2003). Instead, instructors may want to incorporate their rich workplace and relevant life experiences to augment course discussion. Doing so could in turn encourage students to share their personal experiences and enliven the class interchange as well as affect students' decisions to attend regardless of whether PPTs are posted on the Web. Although purely anecdotal, we should note that based on our experience in conducting PPT-related research, we have found students' choice to attend class has less to do with PPT note posting and more to do with their overall satisfaction with the course. Specifically, if students perceive they are going to "miss out" on interesting or important information, they tend to attend class even if PPTs are posted online.

Although untested, some writers have suggested various uncomplicated methods for retaining learner engagement such as using fill-in-the-blanks on handouts so students remain engaged to fill in the information, heavily emphasizing and discussing material not in the text, having students lead class discussion based on the slides, and including blank “brainstorming” slides (Murphy, 2002; Quible, 2002). Technology has facilitated more interactive options in the classrooms, such as the use of clicker technologies, which allow students to anonymously respond to questions from the instructor (e.g., to cast votes, answer impromptu questions, and respond to periodic checks on learning). Interactive white boards, such as those marketed under the Webster brand (http://www.ambra-solutions.co.uk/webster_interactive_whiteboards.htm), may also be helpful in allowing faculty the flexibility necessary to stimulate classroom discussion. Interactive whiteboards allow faculty to annotate PPT slides via an electronic marker that can be used to draw lines, shapes, or letters on top of the whiteboard screen on which the PPT image is being projected and for these annotated slides to be saved electronically and shared with students. As an example, when using PPT to display a picture (or piece of clipart) related to communication, the instructor could pose a question that asks students to examine the image or video for elements or cues and then circle those identified elements on the screen. Or the instructor might ask students to examine a photo of someone dressed for an interview and identify elements of his or her appearance unlikely to make a positive impression.

IMPLICATIONS FOR FACULTY DEVELOPMENT

Given faculty members’ general lack of instructional design knowledge or teaching preparation in traditional doctoral programs (Austin, 2002), continuing faculty development opportunities may be needed to buttress knowledge about how to present course material effectively. Training sessions demonstrating “best PPT practices” as those discussed by Alley, Schreiber, Ramsdell, and Muffo (2006) and updated classroom presentation tools may encourage faculty to consider and evaluate appropriate innovations. Faculty might also find informal learning methods helpful for improving their use of instructional tools by observing or talking with faculty recognized for teaching effectiveness or by seeking out ideas dedicated to teaching presentations

on Web-based chat rooms and discussion boards. Particularly useful could be a working session of faculty and experts interactively reviewing "canned" PPT materials that accompany various textbooks to see which are particularly useful and which are not (and why).

Although internal teaching centers are increasingly prevalent on college campuses, it may be useful (particularly for business communication faculty who teach business presentations as a topic in their courses) to attend workshops by outside experts in strategies of information design. One noted writer and speaker, Edward Tufte, conducts seminars (as do many university faculty development departments and other consulting firms) on topics including effective business presentations and the appropriate display of statistical data. Thus, professional development opportunities that take advantage of outside individuals may be beneficial for faculty.

Interestingly, Tufte argues that PPT, and its weak design tools and lack of statistical symbols (symbols especially relevant for quantitative business disciplines such as statistics, operations management, finance, and accounting), is an inadequate substitute for what should be captured and explained in technical reports. He claims that ready-made PPT templates corrupt statistical analyses, weaken verbal reasoning, and reduce the analytical quality of presentations (Tufte, 2003). In fact, on his Q&A Internet site, Tufte offers the following interesting advice to a person who inquired how to instruct a 3-hour presentation on a technical topic:

You probably should average about one 4-page technical report per hour or two; that report should contain graphics, tables, text, and whatever it takes to explain something. Use a slide projector only for full-screen color images and videos. Use the handout technical reports for everything else. In short, your presentation program is Word not PowerPoint. Use slide-ware only as a projector operating system for full color images and videos. (Tufte, 2005)

Such advice essentially calls for a return to simpler, low-tech methods for instruction, at least for those courses steeped in quantitative material. Perhaps such an approach deserves our closer consideration, especially if critical thinking, reasoning, and problem skills are important objectives. That is, are we trying to develop authentic learners or regurgitating note takers?

CONCLUSION

This study investigated whether students in the contemporary business classroom view PPT as a novel stimulus and whether it affects their perceptions of certain instructional outcomes. The results of our study indicate that the degree of novelty that undergraduate business students associate with PPT-based teaching significantly relates to their perceptions of PPT's impact on cognitive learning and classroom interaction. Students' view of PPT as a novel stimulus is also associated with their perception of specific constructive and dysfunctional classroom behaviors and attitudes. As with any study, ours has limitations, including the single-campus student sample, use of perceptual data (instead of learning outcomes), and lack of experimental control. However, the results do suggest fruitful avenues for additional exploration. For example, it would be useful to conduct an experimental comparison of PPT with variants of other lecture formats across multiple business school settings using multiple-source data. One topic deserving additional attention is how various subject matters or disciplines in business schools are best presented to students for learning and engagement purposes; students' open-ended responses in our study support such an investigation. Other consequences to study when using PPT in business classrooms, likely commensurate with contemporary assurance of learning efforts in business schools, include the influences of PPT instruction on helping students to develop critical thinking, creativity, and analytical skills.

It may behoove business educators (as well as textbook support professionals) to test and evaluate software alternatives to PPT such as Macromedia Flash, Apple Works, and other programs listed at <http://www.msboycott.com/thealt/alts/powerpoint.shtml> and http://www.inspiration.com/insp_business. Some software options appear particularly well suited for visually representing complex relationships of business information by readily incorporating process flow charts, organization charts, business plans, production schedules, idea maps, and schedules into presentation materials. In this effort, faculty (and textbook developers) should receive adequate training to ensure the new instructional software is consistently utilized with adult learning theory and principles of appropriate graphic display. Otherwise, we may just transfer old problems to the use of the new software.

Ultimately, studies in an experimental context examining various course-relevant outcomes from the use of PPT versus alternative software could be of value to educators in all business disciplines.

APPENDIX: Scales and Factor Analyses Results for Cognitive Learning and Classroom Interactions Scales

Cognitive Learning Impact of PPT (Cronbach's $\alpha = .879$)

- CL1. Helps [me/students] to learn the material in a way that is comfortable.
- CL2. Results in information being easier to remember.
- CL3. Makes note taking easier [for students].
- CL4. Results in a more appropriate pace for lecture.
- CL5. Causes the flow information in class to be less disrupted.
- CL6. Makes examples presented in class clearer.
- CL7. Allows [me/students] to better coordinate lecture material with text material.

Impact of PPT on Classroom Interactions (Cronbach's $\alpha = .868$)

- CI1. Helps [me/students] better know the [others/other students] in class.
- CI2. Makes [me/students] feel more of a participant in class.
- CI3. Better establishes rapport between [the instructor/me] and [the/my] students.
- CI4. Facilitates class discussion.

NOTE: All items used a 6-point scale with responses ranging from 1 (*traditional lecture better*) to 6 (*PPT lecture better*).

Rotated Component Matrix

Item	Component	
	Factor 1: Cognitive Learning	Factor 2: Classroom Interaction
CL1	.759	.377
CL2	.750	.254
CL3	.743	.185
CL4	.735	.168
CL5	.688	.216
CL6	.676	.281
CL7	.649	.174
CI1	6.576E-02	.832
CI2	.363	.807
CI3	.318	.799
CI4	.398	.698
Eigenvalues	6.371	4.113
% of variance extracted	37.476	24.192
Cumulative %	37.476	61.667
Cronbach's α	.879	.868

NOTE: Rotation converged in three iterations. Extraction method: principal components analysis. Rotation method: Varimax with Kaiser normalization.

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